



Concussions Occurring Among Our Soldiers Deployed in Iraq

In a recent [article published in the 31 January 2008 issue of the New England Journal of Medicine](#), COL Hoge and others presented the results of an anonymous survey they conducted in 2006 on over 2500 Active Duty and Reserve (Army National Guard) Soldiers 3 to 4 months after their return home following a one-year deployment to Iraq. The results of the survey were surprising to many people as it indicated that mild traumatic brain injury (or concussion), when associated with loss of consciousness, resulted in a large increase in post traumatic syndrome (PTSD) when compared to those Soldiers with other injury types or no injuries while serving in Iraq.

The results of this study can be surprising to many unfamiliar with traumatic brain injuries (TBI) and with PTSD. Mild TBI is synonymous with concussion; these words describe the same condition. However, the use of the words 'brain injury' implies more severe or unrecoverable injury than intended. Recovery from mild TBI or concussion is most often (85%) rapid and complete. With moderate and severe brain injuries, there are usually conclusive findings on diagnostic tests (x-rays, brain scans) or with clinical examination to include cognitive testing. Recovery from moderate or severe brain injury requires more time and may not be complete. An analogy with a simpler, less threatening type of injury is a simple ankle sprain versus more serious and permanent injuries to the leg.

The findings that most of the health problems suffered by soldiers experiencing "post concussive symptoms" can be related to PTSD and depression are surprising but promising in that PTSD and depression are better known and more easily treated than the less well defined condition referred to as "post concussive syndrome".

General Questions and Answers about the Study

Is concussion different from mild TBI?

The term "concussion" refers to exactly the same thing as the term "mild TBI". This is confusing because the term "TBI" also includes moderate and severe brain injuries where there is obvious damage to the brain caused, for example, by a penetrating wound or skull fracture.

What are some common "post concussive symptoms"?

Common post concussive symptoms include headaches, sleep problems, concentration/memory problems, dizziness, or irritability starting at the time of injury. These symptoms usually resolve very quickly with rest or supportive medical care. If they persist for more than a few days, studies have shown that this is most often due to co-existing depression or PTSD, probably due to other associated lifestyle factors.

Studies have shown that patients who believe that their concussion will cause lasting symptoms are more likely to have symptoms, which is why it is so important to provide reassurance and education that promote the expectation of a rapid recovery.

What is the best treatment for concussions?

Studies have shown that the most effective medical treatment for concussion is normalizing symptoms and providing reassurance and expectation of rapid and full recovery. As with other symptom based conditions, post concussive symptoms need to be managed using evidence-based and collaborative care approaches centered in primary care.

Most people may understand the term “concussion” as referring to a common and not very serious injury with rapid recovery, whereas this may not be the impression one gets from the term “mild TBI”. The term “mild TBI” is a bit of an oxymoron, with the word “mild” combined with “brain injury” or, as the Soldier may hear it as “brain damage”. There has been a lot of confusion or misinformation lately with many people who see news stories thinking that 10-20% of Soldiers coming back from Iraq have serious brain injuries. This simply isn’t true. The vast majority of Soldiers who have been told that they have a “traumatic brain injury” are in the very mild category which means that they have had a concussion from which they will most likely quickly recover.

Is there something different about concussion occurring in combat?

There is no evidence that being knocked unconscious for 30 seconds from a blast explosion is any different than being knocked unconscious for 30 seconds on a football field or in a motor vehicle accident, in terms of the physical effect to the brain. However, there is one important difference, and this is the context in which the combat-related concussion occurs. Many other things may happen when the Soldier experiences a concussion in combat, such as a buddy being seriously injured or killed, damage or injury to civilians nearby, or the fact that having the concussion indicated a really close call, a near miss on the Soldier’s own life, or the fact that the concussion occurred in the context of combat with the enemy. This is likely why so many Soldiers who report concussion while deployed to Iraq develop PTSD, and why concussion in combat is so strongly associated with PTSD.

How many Soldiers experienced concussion (or mild TBI) while deployed?

15% experienced a concussion, although only about one-third of these (5% of all Soldiers) lost consciousness, with the remainder just being briefly dazed or confused. Most reported that the injury was related to being near an explosion.

Is this a high percentage of Soldiers?

Concussion is very common in the general population, occurring in relation to sports, motor vehicle accidents, and other types of trauma. There have been several assessments of Soldiers returning from Iraq and Afghanistan that have not been published which have found rates very consistent to the 15% found in this [Walter Reed Army Institute of Research \(WRAIR\)](#) study (ranges varied from 10 to 20%). However, of these, only about one-third (or 5%) had loss of consciousness, usually very brief (<3 minutes), with the remainder just being “dazed or confused” around the time of the injury. There are many reasons that Soldiers may be dazed in combat, and it is not known if the screening question related to being dazed or confused really indicates that they had a brain injury.

What was the result of having a concussion for these Soldiers? Didn’t Soldiers who had concussions have very high rates of other health problems?

Concussion can result in physical symptoms, called post-concussive symptoms, such as headaches, sleep disturbance, irritability, or complaints about memory or concentration.

These symptoms usually resolve very quickly, within a few days, although for reasons that are not well understood, some people may experience persistent physical health complaints after a concussion. This study showed that most of the health complaints among Soldiers who reported concussion were associated with PTSD and depression, a finding that highlights the importance of recognizing the context in which the concussion occurs. This is important because if we don't take PTSD or depression into consideration we might misdiagnose these Soldiers as having a brain injury with ongoing post-concussive symptoms, when in fact they have another condition requiring very different treatment.

What is the relationship of PTSD to concussion?

Nearly 45% of Soldiers who reported a concussion with loss of consciousness also met criteria for PTSD. Concussion was also associated with depression. Of note, Soldiers who had a concussion while deployed were much more likely to have physical health problems when they came home than Soldiers with other injuries. However, these health problems were almost exclusively in those who had PTSD or depression. In those without PTSD or depression, there was no relationship between concussion and physical health problems. This is what we would see if the physical health problems are due mainly to PTSD and depression rather than due to the concussion.

Can PTSD and depression cause physical health problems?

Studies have shown that PTSD and depression are both important causes of physical health problems. PTSD and depression can be considered physiological conditions with definite physiological signs and symptoms. About a year ago, Dr. Hoge and his group published a study involving Iraq War veterans that confirmed the strong association of PTSD with poor general health, physical symptoms, missed work, and a higher use of medical services.

Why is PTSD or depression so important in causing the physical symptoms?

Many studies have shown that people with depression or PTSD are much more likely to have physical illnesses or symptoms than people without PTSD, likely because of the effects of PTSD on the immune system and in elevating levels of adrenaline. What is suggested by this study is that concussion in combat represents a very significant traumatic event, such as a close call on one's life that can lead to PTSD. Then the PTSD leads to all sorts of physical health problems. What is meant by the term "mediate" in the study is that PTSD and depression explained the physical symptoms that occurred among Soldiers who had concussions.

Does this mean that mild TBI or concussion is not a serious combat-related medical problem, and that PTSD is the only serious concern here?

No. The study clearly showed that Soldiers who had a concussion during deployment were much more likely to develop PTSD or depression than Soldiers who had other injuries during the same deployment, and that this in turn was associated with much higher rates of physical health problems. Therefore, if a Soldier reports that he had a concussion, particularly if there was loss of consciousness, he is at very high risk for having other health problems when he gets home. However, the study also showed that the concussion itself may not be what is causing the symptoms, and that what is most important for treatment is to address the co-existing mental health problems. Lots of other studies have also shown this.

What is the most important finding of this study?

The most important finding is that the physical health problems that Soldiers with concussion reported after they returned home are related to a large extent by PTSD and depression, two treatable and under-recognized mental disorders. This is good news because if these symptoms were due to concussion, we know relatively less about how to treat chronic post-concussive symptoms compared to what we know about treating depression and PTSD.

What about blast explosions? I've heard that the blast waves may damage the brain without a visible injury. Is this true?

There is no evidence that being knocked unconscious for 30 seconds from a blast explosion is any different than being knocked unconscious for 30 seconds on a football field or in a motor vehicle accident, in terms of the physical effect on the brain.

However, this is an important area of research now. What is most important here is for Soldiers to understand that the research to date has not proven that a concussion from a blast is any different. However, even if there is some effect that has not been able to be measured yet, the brain has a remarkable capacity to heal. Many people think that if the brain is injured in some way that that this will be permanent, and this simply isn't true. The brain can recover completely from concussion and without any lasting effects.

What about repeated concussions?

Repeated concussions can lead to a longer healing time, and this is definitely a concern in Iraq and Afghanistan now, but again, it is not unlike injuries in sports which can also be repeated. What is important is for Soldiers to make sure that they see their doctor as soon as they can after any injury to make sure that there are no complications. They also need to follow their doctor's advice about how quickly to return to duty. If they have one concussion, they may be at higher risk for longer recovery so it is important that they discuss this with their physician.

What is the Army and DoD reaction to these findings?

The Army and DoD are very energetically pursuing a number of new initiatives to help Soldiers with brain injuries, including screening Soldiers when they come back from Iraq as part of the Post Deployment Health Assessment (PDHA). The Hoge article is being reviewed now to assess if changes need to be made to any programs. One important program that the Army has implemented is called RESPECT-Mil to enhance the recognition and treatment of PTSD and depression in primary care clinics.

Is the DoD screening all service members for TBI now?

The DoD has added questions about mild TBI to the routine health assessments that service members receive after coming back from deployment.

The article raises questions about screening, doesn't it? The paper mentions that screening Soldiers for mild TBI might result in "unintended iatrogenic consequences". What did you mean by that? Are you saying that screening could be harmful?

Yes, our biggest concern with screening all service members when they come back from Iraq or Afghanistan for mild TBI is that this could result in many Soldiers believing that they are brain injured, when in fact all that they have experienced is a simple concussion which they will recover quickly from. Even if we tell them that their "TBI" or "traumatic brain injury" is "mild", this diagnostic label may lead Soldiers to think they have a

permanent injury to their brain, or lead their loved ones or family members to attribute their behaviors, such as irritability, sleep disturbance or forgetfulness to a brain injury, when there may be other explanations. There are many studies that have shown is that if one believes that their concussion is serious, that they have a greater likelihood of experiencing distress and symptoms than if they believe that it is not serious, which is why it is so important to provide good education about the nature of these injuries. Reassurance that many Soldiers will fully recover is important.

So how does this work exactly? What is the effect of being told that you have a mild TBI?

Screening all Soldiers for a “brain injury” will likely result in Soldiers believing that their symptoms are due to the brain injury, when there may be other explanations. Medical professionals can inadvertently contribute to this perception through speculation about aspects of combat-related brain injuries that are not well understood, such as the possibility that blast might cause a unique type of concussion. There is a lot of misunderstanding, even within our own medical community, about the nature of mild brain injuries or concussions, and about the possible effects of blast, all of which can contribute to increasing Soldiers’ fears or perceptions that they have a serious condition. Screening is likely to lead to diagnostic tests, procedures, medical visits, or use of medications, all of which can have side effects. The term “iatrogenic” means the unintended negative effects that result from medical care resulting in harm rather than benefit. Often we don’t even realize when this is occurring.

Do you disagree that screening should be conducted? Are you recommending that screening for mild TBI not be conducted?

We are discussing the implications of these findings on current screening programs with the Army and DoD leadership.

What changes in the screening post-deployment are you recommending?

There is a lot of investment now to determine the best ways to screen for mild TBI among service members coming home from Iraq and Afghanistan. There are measures that can be taken to increase the benefits and reduce the possible risks of screening, to include making the questions more specific, conducting screening one time and as close to the deployment as possible, combining screening with an education program to increase awareness of the self-limited nature of concussion, and not repeatedly screening the same individuals over time.

Are you recommending any other changes?

The most important focus for prevention is on what is done at the time of injury. We are also recommending that we reserve the term “brain injury” for moderate or severe injuries and start using the word “concussion” exclusively for the mild category. The medical literature indicates that the focus of treatment needs to be on alleviating distress and symptoms within the primary care system, and educating the primary care doctors who are coordinating care for these Soldiers about the most effective ways to do this. Education can assist Soldiers in understanding that concussion in the war zone is not unlike a sports concussion, but in another context. The DoD and VA already have an outstanding deployment health Clinical Practice Guideline based on the lessons from Gulf War 1 that are very relevant.

Is mild TBI anything like Gulf War illness?

These are certainly very different phenomenon, but we can still benefit from the lessons learned from the first gulf war about how to effectively treat deployment-related physical health problems that cause distress and impairment in veterans. There is a Deployment Health Clinical Practice Guideline, developed after the first Gulf War, that is very relevant in addressing deployment related health concerns including mild TBI symptoms in service members returning from Iraq and Afghanistan.

Why is TBI being called a “signature injury” of this war? What does that mean?

The term “signature injury” has been used recently in news stories and reports to refer to traumatic brain injuries among wounded service members coming back from Iraq and Afghanistan. However, it’s not clear how helpful this term is because it implies that each war is somehow unique in the type of illnesses or injuries that it produces. The fact is that this war is not so different than other wars, although the body armor and outstanding medical care have had a profound effect on bringing more service members home who would have died of their wounds in previous wars. Some of these have severe brain injuries as is common in warfare.

Were you surprised by any of these findings?

We were surprised that PTSD and depression explained so many of the symptoms that are thought to be due to the concussion. It forced a reexamination of the medical literature to understand the implications, not just the literature on concussion, but also the literature on treatment of other medical conditions that involve non-specific symptoms, the risks of diagnostic labeling, and the best ways to deliver medical care for these types of problems.

What would you recommend to Soldiers?

If you have a concussion make sure you get evaluated as soon after it happens as possible to make sure that it is not a more severe brain injury. Once you have been evaluated and your doctor confirms you have nothing more serious than a concussion, then this is good news and you should expect to recover quickly. Don’t be afraid to ask for help from your doctor for problems such as irritability, anger, sleep disturbance, or headaches. If symptoms continue well after the concussion, then this may indicate that you have another deployment-related health concern, including PTSD or depression that is interfering with your recovery or explaining your symptoms. Don’t hesitate to get evaluated.

Wasn’t there a TBI Task Force similar to the Mental Health Task Force? How do these findings compare with the findings from the TBI Task Force?

TBI Task Force members have been aware of this work for some time, but you will have to ask them to what extent the findings from this study informed their report. One of the things that the task force recommended is screening for mild TBI, and we are discussing how best to do this to maximize the potential benefits and reduce the potential risks.

General Questions and Answers about Traumatic Brain Injury**What is TBI?**

Traumatic brain injury can be defined as any direct or indirect force to the head that temporarily (or permanently) disrupts brain function. This can be caused by a direct

blow to the head (boxing, a bean ball), an indirect force (whiplash, sitting in a car hit from the rear), a penetrating injury (shrapnel from an explosion), or an explosive pressure wave (explosion alone without other injuries). It can range from an injury so mild and transient that it can be completely missed, to a severe injury that causes profound coma just short of, or including, death. Traumatic brain injury (TBI) is a complex pathophysiological process affecting the brain, induced by traumatic biomechanical forces. In plain language, it is a blow or jolt to the head or a penetrating head injury that disrupts the function of the brain. Not all blows or jolts to the head result in a TBI.

What are the degrees of TBI?

Mild TBI is the same thing as concussion in football or hockey, and can range from mild enough that a person can go back into the game after a short rest, to being out for the game for several days-weeks. With mild TBI patients, full recovery is expected within minutes to hours; small percentages have symptoms that may persist for longer. Severe TBI usually results from a significant closed head injury, as in an automobile accident, or most open or penetrating injuries, where there may be considerable residual deficits of brain function. Casualties with severe TBI may never return to normal, though this can be difficult to predict.

There is an aggressive program in theater with neurosurgical expertise available. Moderate TBI is in between. There is usually loss of consciousness, from minutes to hours; there can be confusion for days to weeks; and mental or physical deficits that can last months or be permanent. TBI can be closed or penetrating in nature. Severity of closed TBI is graded upon a continuum from mild, moderate and severe. Penetrating brain injury is also another classification of TBI in which the integrity of the skull is compromised by a penetrating fragment or object. The causes of closed and penetrating brain injury include but are not limited to blast/explosion injury (especially in our combat injured), motor vehicle crashes, falls, gunshot wound to the head, neck and face as well as any fragmentation/stab wound to the head.

What is the DoD doing about TBI?

The Defense Department is working on a number of measures to evaluate and treat Service members affected or possibly affected with TBI. In August 2006, a clinical practice guideline for management of mild TBI in theater was developed. Detailed guidance to Army and Marine Corps line and medical personnel was sent to the field to advise them on how to identify, evaluate, protect and treat service members with possible TBI. Not much is known about the mechanism of injury of pure blast induced TBI as opposed to TBI caused by secondary or tertiary effects of blast (direct trauma from fragments caused by the blast, being physically thrown into other objects such as walls or vehicle interiors as a result of the blast). Although it is likely that most TBI due to blast can be attributed to those secondary or tertiary effects, the research community is developing an agenda to address this deficit in our knowledge.

A TBI Task Force was created to thoroughly look at the issue and a report was completed in May 2007. The Defense and Veterans Brain Injury Center (DVBIC), and its network of expertise, serves active duty military members, their dependents and veterans with TBI through state-of-the-art medical care, innovative clinical research initiatives, and educational programs at several military, civilian, and Department of Veterans Affairs (VA) sites across the country. This is a DoD funded unique collaborative effort with the VA that provides TBI-specific evaluation, treatment, and follow-up care.

What is the VA's role in care of service members with moderate and severe TBI?

There are four Department of Veteran's Affairs (VA) Polytrauma centers designed to meet the needs of active duty Service members and veterans. In addition to the four Polytrauma Centers, 23 new VA Polytrauma Network Sites opened in fiscal year 2006 to provide continuing care to injured veterans.

Does TBI happen often to Soldiers? What about in the civilian sector?

TBIs can happen to Soldiers during the course of combat. In a study published by Omyaya, 1996, head injury in the female military member was similar in rates to those of male civilians, and male military service members had the highest rate of TBI. The CDC estimates that there are 1.4 million TBIs each year (2004 data).

It's been reported that had these injuries occurred in Vietnam, the Soldiers would not have lived, but that protective gear and medical technology have changed that for this war. Please discuss these changes.

Advances in armor protection as well as a rapid transport and triage medical system have impacted the survivability of Soldiers with severe and moderate brain injuries. In addition, there is a greater awareness of mild and moderate brain injuries and improved identification of TBI is clearly a factor for changing the outcomes of TBI in this war.

Do people with TBI recover - if so, how does it change their lives? Lives of family, friends?

Yes, full recovery is expected from a concussion (mild TBI), and the majority of patients with TBI in the moderate and severe level recover as well. Recovery is based upon the severity of the initial injury, as well as other factors. There are many ways that having a traumatic brain injury can change a person's life. There can be physical consequences, such as limb weakness or paralysis, headaches, etc. as well as cognitive and neuropsychiatric consequences such as irritability, memory loss and problems, difficulty concentrating, sleep disturbances, anxiety and depression. It is important to distinguish concussion from moderate and severe TBI.

What kind of recovery, what kind of life can men and women who suffer TBI expect?

The kind of recovery depends on the severity of TBI injury. For those with concussion one can expect full recovery quickly. The more severe cases can require comprehensive rehabilitation to help optimize functional recovery. This is where the DoD and VA partnership is key to ensuring a comprehensive approach to recovery and rehabilitation. We know that family support in these situations is key along with adequate family/patient education.

How many Soldiers have been diagnosed with TBI? To what degree?

The Defense and Veterans Brain Injury Center sites have seen 5,020 patients with TBI, ranging in severity of mild to severe and penetrating (01/03 – 11/30/07).

What is the Army doing to help them and their families?

The Army has many programs to help assist the severely wounded with obtaining resources to help with the transition period after a severe injury.

When and how are Soldiers screened for TBI?

Soldiers are screened at various military treatment facilities around the U.S. after injury. They are interviewed to ascertain whether they were involved in a trauma and experienced an alteration or loss of consciousness. They are then assessed for any current symptoms.

Is a diagnosis based on self-reported symptoms?

Diagnosis for concussion is based on an alteration or loss of consciousness. A loss of consciousness can be witnessed and an alteration in consciousness can also be witnessed. However in the context of war, it is difficult to get observers to identify an alteration or loss of consciousness, as you typically would be able to get if the injury occurred during a sporting event.

Does mild TBI cause behavioral changes that could be noticed by other people?

It is important to separate mild (concussion) from moderate and severe. In the case of concussion, behavioral symptoms are likely to be related to PTSD or depression. For moderate and severe TBI, it is important to get a history from family members, as these TBI patients may lack the insight to realize there are changes in their health.

Links to Websites Relating to Concussion (mild TBI)**Article: Mild Traumatic Brain Injury in U.S. Soldiers Returning from Iraq**

Charles W. Hoge, M.D., Dennis McGurk, Ph.D., Jeffrey L. Thomas, Ph.D., Anthony L. Cox, M.S.W., Charles C. Engel, M.D., M.P.H., and Carl A. Castro, Ph.D. **Published at www.nejm.org January 30, 2008**

<http://content.nejm.org/cgi/reprint/NEJMoa072972v1.pdf>

Army Medicine:

<http://www.armymedicine.army.mil/>

Traumatic Brain Injury:

<http://www.dvbic.org>

VA Polytrauma System of Care

<http://www.polytrauma.va.gov/>

Deployment Cycle Support:

<http://www.pdhealth.mil/dcs/default.asp>

Pre-Deployment:

http://www.pdhealth.mil/dcs/pre_deploy.asp

Re-Deployment:

http://www.pdhealth.mil/dcs/re_deploy.asp

Post Deployment:

http://www.pdhealth.mil/dcs/post_deploy.asp

Force Health Protection:

<https://fhp.osd.mil/portal/index.jsp>

U.S. Army Center for Health Promotion and Preventive Medicine:

<http://chppm-www.apgea.army.mil/dhpw/Population/combat.aspx>

Military OnceSource:

<http://www.militaryonesource.com/skins/MOS/home.aspx>

DoD Mental Health Self Assessment Program:

<http://www.pdhealth.mil/mhsa.asp>

Post Deployment Health Assessment:

http://www.pdhealth.mil/dcs/DD_form_2796.asp

Post Deployment Health Reassessment Program:

<http://www.pdhealth.mil/dcs/pdhra.asp>

Army Healthcare:

<http://www.army.mil/wellbeing/healthcare.html>

Healthcare for Veterans:

<http://www1.va.gov/health/>